HARVEY CONSULTING, LLC.

Oil & Gas, Environmental, Regulatory Compliance, and Training

Review of Draft Environmental Impact Statement For the Tesoro Savage Petroleum Terminal LLC Application for Site Certification No. 2013-01 To the Washington State Energy Facility Site Evaluation Council

This review was prepared for Earthjustice.

Earthjustice represents:
Columbia Riverkeeper,
Friends of the Columbia Gorge,
Forest Ethics,
Spokane Riverkeeper,
Sierra Club,
Washington Environmental Council,
Climate Solutions, and
Fruit Valley Neighborhood Association.

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1. Introduction

This report was prepared by Harvey Consulting, LLC for Earthjustice. Earthjustice represents the Columbia Riverkeeper, Friends of the Columbia Gorge, Forest Ethics, Spokane Riverkeeper, Sierra Club, Washington Environmental Council, Climate Solutions, and Fruit Valley Neighborhood Association.

Harvey Consulting, LLC was requested to complete a technical review of the Draft Environmental Impact Statement (DEIS) for the Tesoro Savage Petroleum Terminal LLC (Tesoro Savage or "Applicant") Application for Site Certification No. 2013-01 to the Washington State Energy Facility Site Evaluation Council (EFSEC) to Construct and Operate the Vancouver Energy Distribution Terminal Facility at the Port of Vancouver in Vancouver, Washington on the Columbia River on oil spill risk, and to provide recommendations for oil spill prevention and oil spill response. This report summarizes Harvey Consulting, LLC's review of the DEIS and provides specific recommendations.

This report was prepared by Susan Harvey, owner of Harvey Consulting, LLC. Susan Harvey has over 29 years of experience as a Petroleum and Environmental Engineer, working on oil and gas exploration and development projects. Harvey Consulting, LLC, a consulting firm, provides oil and gas, environmental, regulatory compliance advice and training to clients. Ms. Harvey held engineering and supervisory positions at both Arco and BP including Prudhoe Bay Engineering Manager and Exploration Manager. Ms. Harvey has planned, engineered, executed, and managed both on and offshore exploration and production operations, and she has been involved in the drilling, completion, stimulation, testing, and oversight of hundreds of wells in her career. Ms. Harvey's experience also includes air and water pollution abatement design and execution, best management practices, environmental assessment of oil and gas project impacts, and oil spill prevention and response planning.

Ms. Harvey has worked on oil and gas projects in Alaska, New York, Pennsylvania, Ohio, West Virginia, Colorado, Texas, New Mexico, California, and Oklahoma, as well as in Canada, Australia, Russia, Greenland, Belize, and Norway. Ms. Harvey has authored numerous technical reports related to oil and gas project construction, operation, and abandonment, including best practices for oil and gas well construction, air and water pollution abatement design and execution, environmental assessments of oil and gas projects, and oil spill prevention and response planning. Ms. Harvey holds a Master of Science in Environmental Engineering and a Bachelor of Science in Petroleum Engineering.

2. Findings Summary

1. **Proposed Action Increases Oil Spill Risk and Oil Spill Consequences.** Oil spill risk assessments examine the probability of a spill occurring and the consequences of the spill. Therefore, oil spill risk is a function of probability and consequences (spill risk = spill probability x spill consequences); oil spill risk increases commensurate with increases in oil spill consequences. The Proposed Action has high oil spill consequences because it seeks approval to transport an average of 360,000 barrels (bbls) of crude per day from in-land production locations (North Dakota and Alberta Canada), and transport that oil down the Columbia River and on the Pacific Ocean to onshore refineries in Washington and California, and more distant refineries in Alaska and Hawaii. The Proposed Action increases risk and consequences by placing oil onto water resources (that can more safely be transported over land) and by transporting oil long distances, rather than supplying refineries with more proximate oil supplies.

2. **Incomplete Cumulative Risk and Cumulative Consequence Analysis**. The DEIS does not integrate the Appendix D (terminal), E (rail), and J (vessel) risk assessments to provide a cumulative oil spill risk and hazard risk assessment, nor does it provide a complete consequence analysis of the

cumulative risk and hazards presented by the proposed activity.

3. **Project Need is Not Justified**. Neither the Applicant nor the DEIS make a compelling case for this project's need. The DEIS contains insufficient information on the product sources and transportation methods currently used to supply Washington, California, Alaska, and Hawaii refineries to compare the net environmental impact of the No Action Alternative to the Proposed Action. The Applicant asserts there is insufficient rail, pipeline, and refining capacity to transport North Dakota and Canadian crude oil supplies to onshore refineries; however, future oil production and capacity data is not provided to support this position. The DEIS does not examine the current or future predicted oil price, nor adequately examine the availability of the proposed crude oil supplies during low oil prices. Both Bakken crude oil and Canadian tar sand oil production will be significantly impacted by low oil prices; production rates, and volume of oil to be transported to refineries will decline.

4. **Proposed Action Poses a Substantially Higher Risk of a Spill to Water**. The Proposed Action increases the risk of a spill to water by proposing to route crude oil over water resources and by doubling the number of transfer points in the transportation route from oil production to a refinery. The Proposed Action creates a new risk of spilling oil to water when loading a tanker on the Columbia River and when transporting oil down the Columbia River and on the Pacific Ocean. The Proposed Action includes four transfer points (oil production facility to rail, rail to terminal, terminal to tanker, tanker to refinery) versus the No Action Alternative that would continue to use existing overland routes that only have two potential transfer points (oil production facility to rail or pipeline, and rail/pipeline to refinery). Each transfer point increases the potential for human error and mechanical failure, and increases spill risk.

5. **Reduced Capacity Alternative Did Not Examine Beneficial Alternatives**. The DEIS concluded the Reduced Capacity Alternative provides no net environmental benefit because it examined alternatives that wouldn't provide significant benefit. The Reduced Capacity Alternative should have examined: (a) eliminating higher risk and consequence crude oil types (e.g., dilute bitumen); (b) reducing the storage tank size; and (c) use of smaller tankers.

6. **Two-Thirds of DEIS Assumptions Are Unsupported**. With the exception of plans proposed by Tesoro (a terminal owner planning to use approximately one-third of the facility capacity), approximately two-thirds of the crude oil sourcing, rail road routing, and tanker fleet plans for the other customers is unknown and could considerably vary from the scope examined in the DEIS. Mitigation measures proposed by Tesoro and its selected railroad transportation operator (BNSF) and tanker operators may not be used/implemented by other customers using the terminal, or by the rail and vessel operators hired by those other customers. Alternate crude oil sources, routes, and transportation methods may be used that have not been studied in the DEIS.

7. **Terminal Operating Life of 20 Years is Not Justified; Longer Operating Life Increases Potential Impacts**. The DEIS assumes a 20-year operating life for the Proposed Action. Terminals typically operate for longer periods than 20 years once built. There is no justification for the 20-year timeframe. Impacts beyond the 20-year estimated operating life were not examined in the DEIS.

8. **Increased Risk of Oil Spills on Washington State Railways.** The DEIS proposes to increase the amount of oil transported into Washington by railroad. However, both state and federal regulations are insufficient at this time to address this increased risk. Federal Regulations (Title 49, Code of Federal Regulations (CFR), Part 130) would only require a basic federal oil spill response plan for the railcars carrying less than 42,000 gallons of crude oil for this Proposed Action and would be exempt from preparing a comprehensive federal spill plan. While the federal government is considering

improvement of these standards in the future, the outcome of future federal rulemaking is uncertain. Washington State has also determined federal contingency plans for railroads transporting oil in bulk are insufficient to mitigate the potential risk of a spill and Washington State is in the process of developing rules for railroads transporting oil in bulk; the outcome of these future regulations is also uncertain.

9. **New Railcar Design Requirements May Not Apply**. The new May 1, 2015 U.S. Department of Transportation (DOT) Specification 117 tank car standards to more safely ship crude oil may not apply to this Proposed Action for a period of at least a decade. DOT Specification 117 only applies to construction of new tank cars constructed after October 1, 2015 and provides a ten-year window for existing tank cars to be retrofitted with safety improvements.

10. **Terminal Oil Spill Contingency Plan is Incomplete.** The Applicant's proposed Operations Facility Oil Spill Contingency Plan includes an incomplete list of on-site oil spill response equipment that does not provide quantities of equipment or information on equipment design or selection. It is not possible to determine if the proposed resources are sufficient. A complete Facility Response Plan (FRP) is not available. Oil Spill Response Planning Standard Calculations do not verify there is sufficient response capability to meet Washington State's Oil Spill Response Planning Standard. Local fire departments are not currently trained or resourced, and are not fully equipment to respond to an industrial fire or emergency at the terminal and along the rail corridor. The Applicant does not plan to provide its own terminal industrial firefighting personnel or equipment.

11. **Earthquakes Pose Risk of Multiple Tank Spills**. Large earthquakes pose the risk of simultaneously damaging multiple tanks at a storage terminal and spilling oil into the Columbia River. The Applicant proposes to install a secondary containment system (606,020 barrels); this volume is larger than the largest tank (380,000 barrels). However, the total terminal storage capacity is proposed to be 2,160,000 barrels. A multiple tank failure could overwhelm the secondary containment system leaking oil into the Columbia River, even if the secondary containment system stayed structurally intact during a large earthquake. This risk is not examined in the DEIS.

12. **Worst Case Tanker Oil Spill Consequences Were Not Examined**. The DEIS lists two different worst case discharge volumes for a potential spill from an oil tanker transiting the Columbia River. The DEIS did not examine the consequences of the largest possible oil tanker spill volume, a spill of an Suezmax Oil Tanker's cargo (729,560 bbls). Instead, the DEIS only examined the potential consequences of a spill of 192,144 bbls (assuming that only 1/4th the maximum cargo volume might spill in a worst case). The DEIS concludes there is a low probability of an oil spill, but doesn't provide a thorough assessment of the consequences of a spill if one were to occur. The consequences of a spill releasing a large volume of oil into the Columbia River or Pacific Ocean (especially diluted bitumen) would be very high. There is no oil spill trajectory showing the route or consequences of a major tanker collision, allision or grounding along the tanker route to each refinery destination. The Vessel Spill Risk Analysis specifically excludes a complete consequence analysis, and states that "*trajectory, fate, and effects modeling for specific spill scenarios related to Vancouver Energy vessel traffic is outside the scope of the current study*."[1] The DEIS provides estimates of the number of river miles and square miles of potential contamination in a worst case discharge, but does not provide a comprehensive consequences analysis for the worst case discharge (entire cargo loss).

13. **Existing Columbia River Response Resources Are Insufficient to Respond to a Tanker Spill**. The Maritime Fire Safety Association (MFSA) Vessel Response Plan is currently limited to a

[1] DEIS, Appendix J, Vessel Spill Risk Analysis, Page 45.

maximum worst case spill of 300,000 bbls on the Columbia River, and is designed to respond to refined product spills (not unrefined crude oil spills). The Proposed Action requests approval to transport crude oil ranging from 319,925 bbls (Handymax Oil Tanker) to 729,560 bbls (Suezmax Oil Tanker). Therefore, the MFSA Vessel Response Plan's capability to respond to a Worst Case Discharge of 300,000 barrels on the Columbia River is insufficient for crude oil tankers proposed to service this terminal. The plan does not demonstrate the capability to respond to spills of the types and volumes of crude oil proposed for this project. MFSA does not cover the Ocean Zone, and the DEIS is unclear which response organization would be responsible for providing that coverage enroute to each possible refinery destination.

14. **Comprehensive Columbia River Vessel Traffic Risk Assessment Missing.** The DEIS does not contain a comprehensive vessel traffic risk assessment for the Columbia River. Therefore, the relative risk (probability and consequence) of a vessel incident resulting in damage to vessels transiting the Columbia River, and the potential for an associated oil spill occurring in the Columbia River based on the increased number of tanker transits has not been studied. The DEIS used historic tank vessel traffic accident statistics for the Columbia River (1990-2011) to estimate the probability of future accidents, assuming accident statistics will remain at or below historic levels that occurred with less than half the number of vessel trips on the Columbia River. The DEIS does not examine the potential for accidents to increase when the number of tanker trips is more than doubled, underestimating the accident risk and frequency, especially the potential number of vessel to vessel collisions. The Proposed Action plans to have 365 round trip tanker trips per year. Based on historic data alone, this would mean there is a risk of a tanker grounding or collision at least once every 7.2 years. Tank vessel allisions are more frequent at one incident for every 588 trips, meaning there is a risk of a tank vessel allision at least every other year.

15. **Tanker Loading and Tanker Transit Risk Reduction Alternatives Not Examined.** The Applicant anticipates water current speed on the Columbia River will be a deterrent to effective pre-booming for a substantial portion of the year. If a spill were to occur, boom would be required to collect and contain oil. If environmental conditions on the Columbia River preclude booming the tanker during loading, oil spill response booming will be equally ineffective. If it isn't safe or effective to boom a tanker docked at the berth to load oil, then the tanker should not be loaded with crude oil. Risk reduction alternatives such as reduced tanker transit frequency, limits on the number of laden tankers in the Columbia River channel, limits on vessel traffic and anchorage maneuvers during outbound transits, safe speeds for laden tankers, improvements in the vessel tracking system, the use of tug escorts and the types of tugs needed to safely escort large tankers along the river (except docking tugs), alternative routing and tanker transit timing strategies to avoid grounding in shallow areas of the river have not been analyzed. The Columbia River mouth bar is a risky crossing, especially during winter storms and large tide changes. The DEIS does not provide a comprehensive assessment of this risk, nor offer sufficient mitigation strategies.

3. Recommendation Summary

It is recommended that the Final EIS address the following recommendations:

1. **Include a Cumulative Risk and Cumulative Consequence Analysis**. Integrate the Appendix D (terminal), E (rail), and J (vessel) risk assessments to provide a cumulative oil spill risk and hazard risk assessment and provide a complete consequence analysis of the cumulative risk and hazards presented by the Proposed Action. The consequence analysis should include oil spill trajectory maps showing the location and route the oil would travel until the oil is cleaned up. Identify the expected

number of miles of oil impacted coastline, and describe aquatic ecosystem and other wildlife impacts along the spill trajectory, for the period of time until the oil spill is cleaned up. Provide an estimate of the number of days it would take to clean up a worst case discharge for each transportation method (spill along the railway, spill at the terminal, and spill on water).

2. **Examine Reduced Impact Alternatives.** The EIS should examine alternatives that: (a) reduce the risk of oil spills to water resources, (b) eliminate higher risk and consequence crude oil types (e.g., dilute bitumen), (c) reduce storage tank size, (d) use smaller tankers, (e) reduce the number of transfer points on the route from oil production facilities to refineries, (f) supply Alaska refineries with more proximate Alaska oil production, (g) reduce the carbon footprint of transporting each barrel of oil from its point of production to a refinery, (h) place the terminal in a lower seismic risk location, and (i) place the terminal in a location where tanker pre-booming will be effective during most of the year.

3. **Provide Justification for Proposed Action Assumptions.** The EIS should include a current and future economic assessment justifying the need for this terminal. The EIS should provide more information on the source of crude oil, railroad routes, and tanker fleets that will be used by Tesoro Savage's customers. The EIS should provide justification for a limited 20-year facility operating lifespan, or should be revised to examine the impacts of a longer operating life.

4. **Include a Complete Terminal Oil Spill Contingency Plan.** Provide a complete Facility Oil Spill Contingency that examines the risk and consequences of multiple tank oil spills into the Columbia River and demonstrates the capability to respond to rapidly respond to this scenario with sufficient, dedicated personnel, equipment and contracts and protect sensitive resources in a timely manner.

5. **Evaluate Worst Case Tanker Oil Spill Consequences**. Examine the consequences of a worst case oil spill of the largest oil tanker proposed, a Suezmax Oil Tanker's cargo (729,560 bbls). Include an oil spill trajectory showing the route or consequences of a major tanker collision, allision, or grounding along the tanker route to each refinery destination.

6. **Provide Sufficient Columbia River and Pacific Ocean Response Resources to Respond to a Tanker Spill**. Provide a Vessel Response Plan that provides sufficient crude oil spill response resources to respond to the worst case discharge from the largest planned tanker (e.g., Suezmax Oil Tanker's cargo (729,560 bbls)).

7. **Complete a Comprehensive Columbia River Vessel Traffic Risk Assessment.** Provide a comprehensive vessel traffic risk assessment for the Columbia River that examines the relative risk (probability and consequence) of a vessel incident resulting in damage to vessels transiting the Columbia River, and the potential for an associated oil spill based on the increased number of tanker transits. Provide information on existing tanker transit routes and hazards in the Columbia River compared to the route that tankers will take to reach the proposed Tesoro Savage Petroleum Terminal, and provide an explanation of whether allision, collision, and grounding hazards increase. Examine risk reduction alternatives such as reduced tanker transit frequency, limits on the number of laden tankers in the Columbia River channel, limits on vessel traffic and anchorage maneuvers during outbound transits, safe speeds for laden tankers, improvements in the vessel tracking system, the use of tug escorts and the types of tugs needed to safely escort large tankers along the river, and alternative routing and tanker transit timing strategies to avoid grounding in shallow areas of the river.

8. **Provide a Complete No Action Alternative Assessment**. Include a thorough analysis of the net environmental impact of the No Action Alternative to the Proposed Action.

9. **Require Contracts for Dedicated, Immediate Spill Response Resources.** Require dedicated workboats and personnel that are capable of responding within a few hours of the spill (prior to hour 5). Require sufficient personnel and workboats to install boom to protect the 46 environmentally sensitive priority protection sites identified within the initial oil spill trajectory path before the oil reaches them.

10. **Limit Tanker Loading to Periods Where Pre-booming is Effective**. Require tanker loading to be limited to periods when tanker booming is effective to prevent oil spills from occurring when tanker booming is not possible due to river conditions that prevent effective pre-booming.

11. **Railroad Improvements**. Either postpone evaluation of this project until rules for railroads transporting oil in bulk though the state is complete, or require the Applicant voluntarily agree to meet the more comprehensive planning standards of 49 CFR § 130. Require all tank cars used to transport crude oil the Vancouver Energy Distribution Terminal Facility be a new tank car constructed to meet the DOT Specification 117 standards, or existing tank cars retrofitted to DOT Specification 117 standards. Voluntary oil spill prevention standards adopted by Burlington Northern Santa Fe (BNSF) (that exceed federal standards) should be required as standard mitigation measures for all railroad servicing the proposed terminal (e.g., increased track inspections, speed restrictions, use of new safety technology).

12. **Increase Transfer Pipeline Catchment Volume**. Increase the catchment volume of the transfer pipeline system used to route oil to the tankers docked at Berth 13 to 267 barrels of oil (vs. 3 bbl catchment planned) or decrease the shutoff valve timing to reduce the maximum potential spill volume that may reach the catchment.

13. **Berth Maintenance and Repair Plan**. Require a Maintenance and Repair Plan for Berth 13 for the proposed facility lifespan.

14. **Prohibit Bunkering Operations**. Include a prohibition on bunkering operations at the Tesoro Savage Petroleum Terminal and the Lower Columbia River in the final EIS to match the proposed plan.

15. **Improve Fire and Emergency Response Resources**. Require the Applicant to provide its own, professionally trained industrial firefighting personnel and equipment to provide sufficient resources to respond to an industrial fire at the terminal. Require railroad operators to show they have their own, professionally trained industrial firefighting personnel and equipment along the rail corridor, or that they have worked with each volunteer fire department along the route to provide financial resources, training, and capacity building support to ensure the capability is sufficient to respond to a crude oil railcar accident.

16. **Improve Geographic Response Plans (GRPs)**. Require the Applicant to contribute to and complete updates of the Lower Columbia River GRP and other applicable Northwest GRPs, to address the type and amount of crude oil moving to and from the Proposed Facility, and demonstrate it has its own (or contracted resources) to implement the GRPs ahead of the spill. This work needs to be completed prior to construction and operation of the Proposed Facility.

17. **Improve Secondary Containment Liner Design**. Require improvements to both the liner and berm system to ensure that oil spilled into the secondary containment liner/berm system during a large

earthquake will remain in the containment system and that the liner is not a failure point.

18. **Require Marine Pilots for All Vessels**. Require Articulated Tug Barges (ATBs) transporting crude oil to use pilots.

4. Facility Need

Neither the Applicant or DEIS makes a compelling case for this project's need. The Applicant requests approval to construct a crude-by-rail terminal in Washington State along the banks of the Columbia River in the Port of Vancouver, Washington to receive oil by train from North Dakota and Alberta, Canada. This project proposes to load crude oil tankers at the Vancouver Energy Distribution Terminal Facility, transport oil down the Columbia River, and across the open ocean "*to marine facilities capable of offloading the crude oil for delivery to receiving refineries.*"[2] Refineries will be located primarily on the West Coast of North America.[3] The Applicant's stated purposed and need for the terminal is to:

> *Construct and operate a facility that would provide the service of trans-loading mid-continent North American crude oil to the West Coast to allow shipment of crude oil to refineries located primarily on the West Coast of North America.*

Oil would be stored in six large, newly constructed 380,000 barrel (bbl) crude oil storage tanks on the banks of the Columbia River to be loaded on tankers and barges at the Port of Vancouver, Washington. Tanker traffic will be more than doubled in the Columbia River, with the proposed goal of shipping oil from the Port of Vancouver, on-water along the Columbia River, and in the Pacific Ocean to refineries along the West Coast of the United States, Hawaii, and Alaska.

The DEIS does not provide sufficient justification for shipping high consequence crude oil (e.g., diluted bitumen) all the way from Alberta, Canada, over water (on the Columbia River and Pacific Ocean) to refinery destinations in Alaska, Hawaii, California and Washington.

Alberta tar sand crude oil (diluted bitumen) is a heavy, low quality crude oil that is difficult to clean up and is persistent in the environment when spilled. Diluted bitumen sinks or submerges below the water surface when spilled, substantially increasing spill consequences.

Diluted bitumen is created by combining oil produced from oil sands with natural gas condensate. The resulting mixture is a low quality crude oil that tends to sink when spilled into a water body. The Washington State Department of Ecology identified significant oil spill response concerns associated with diluted bitumen when spilled to water:

> *The concern about diluted bitumen is that it can become submerged below the water surface or sink to the bottom when spilled into water…This created challenges for spill response and may cause environmental impacts, particularly to fisheries, due to the oil's persistence in sediments and other parts of the environment.*[4]

Because diluted bitumen tends to sink when spilled to water, it would be prudent not to intentionally place this type of crude oil into tankers for transportation on water. The DEIS did not examine, but should, the alternative of eliminating the diluted bitumen as a product source.

[2] DEIS, Executive Summary, Page ES-2.
[3] DEIS, Executive Summary, Page ES-4.
[4] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 18.

An EIS must address reasonable alternatives to the proposed action, including a No Action Alternative. WAC 197-11-440(5). The DEIS contains insufficient information on the product sources and transportation methods currently used to supply Washington, California, Alaska and Hawaii refineries, to compare the current No Action Alternative to the Proposed Action. The risk and consequences of the Proposed Action must be compared to the No Action Alternative. There is insufficient information in the DEIS to compare the net environmental impact of those alternatives.

The DEIS states the Proposed Action is needed to supply North Dakota's and Canada's crude oil to Tesoro's Alaska refinery because Alaska oil production is declining and will be insufficient in the future to supply Tesoro's Alaska refinery with crude oil. The DEIS does not provide current or future estimates of Alaska's crude oil production. There is insufficient information to support the position that Alaska production will decline below Tesoro Alaska refinery's needs during the assumed 20-year life span of the proposed terminal.[5] Tesoro's Kenai, Alaska refinery currently processes up to 72,000 barrels of crude oil from oil production in Cook Inlet, Alaska.[6] The State of Alaska reports that 510,000 barrels of oil were produced in Alaska in 2015. The State of Alaska forecasts oil production in Alaska will exceed the Tesoro Kenai refinery demand in the next 20 years.[7]

Because Alaska's Cook Inlet and North Slope oil production facilities are forecasted to continue producing oil over the next several decades, transporting crude oil by rail and vessel all the way from North Dakota and Canada to Alaska not only increases the likelihood of terrestrial and on-water oil spills by increasing the distance that a barrel of crude oil is transported from the point of production to a refinery overland and water, but also substantially increases the carbon footprint to refine a barrel of oil at Tesoro's Alaska refinery.

The DEIS did not, but should, evaluate the reduced risk and reduced environmental impact of supplying Alaska refineries with more proximate Alaska oil production. This alternative reduces the total distance oil is transported and the energy required to transport each barrel to be refined, and reduces the distance and risk of on-water crude oil transport.

The DEIS states the Proposed Action is needed to supply refineries in Washington and California. Washington and California refineries are currently supplied with crude oil. The DEIS does not provide sufficient information on the current or future project sources of crude oil for the refineries listed in Table 2-13[8] that are proposed to be supplied by this project. More data is needed to evaluate the net environmental benefit of supplying crude oil to these refineries via the Proposed Action, versus alternatives.

The DEIS should include a 20-year forecast showing the anticipated source and transportation route for crude oil that would be supplied to Washington and California refineries (proposed to be supplied by this terminal) if the terminal was not built. This information is needed to better understand the alternative risk and consequences of the No Action Alternative. For example, some Washington and California refineries are currently supplied by oil shipped by rail or pipeline. The DEIS risk analysis should compare, but does not, the risk and consequences of the current oil supply route to this newly proposed route that includes four transfer points (oil production facility to rail, rail to terminal, terminal to tanker, tanker to refinery) and transportation of crude oil over water versus existing routes that may only have two potential transfer

[5] DEIS, Chapter 2, Page 2-62, states: "The operational lifetime of the proposed Facility is assumed to be 20 years."
[6] http://tsocorp.com/refining/kenai-alaska/, Accessed January 7, 2016.
[7] http://dog.dnr.alaska.gov/Publications/Documents/AnnualReports/Section1_2009.pdf
[8] DEIS, Chapter 2, Page 2-74.

points, (oil production facility to rail or pipeline, and rail/pipeline to refinery) and be fully confined to on-land transportation routes. Each transfer point increases the potential for human error, mechanical failure and increases spill risk.

The proposed project seeks to place an average of 360,000 barrels of oil per day on the Columbia River and in the Pacific Ocean. The DEIS does not provide sufficient information to understand the existing U.S. rail, truck transport, and pipeline system capacity to move this oil from North Dakota and Canada to refineries in Washington and California without placing this volume of oil on water. Increased oil spill risk to water resources is created by proposing to transport crude oil to Washington and California refineries over water resources rather than transportation over land. More information is needed to better understand the existing on land transportation capacity to fully inform the potential risk reduction to water resources by selecting the No Action Alternative. The DEIS provides a cursory analysis of the net environmental impact of the No Action baseline to the Proposed Action; a thorough analysis should be provided.

The DEIS states the proposed facility is needed to supply North Dakota and Canadian crude oil to Tesoro's Hawaii refinery. The DEIS does not explain the current or future planned sources of oil for its Hawaii refinery and does not compare the risk and consequences of supplying the Hawaii refinery with oil from this new facility versus other alternatives. The EIS should determine if there is actually a need to ship oil from North Dakota and Canada to supply Tesoro's refineries in Hawaii, or whether there are other alternative supplies with a lower carbon footprint and lower environmental transportation risk profile. If the Proposed Action is the lowest carbon footprint and lowest environmental risk, then the EIS should evaluate a reduced capacity alternative for a terminal to supply only the refineries that required oil to be placed in a tanker and shipped across the Pacific Ocean.

The DEIS includes a list of refineries (Table 2-13)[9] that are proposed to be supplied by this project. Tesoro's refineries are anticipated to require approximately one-third of the terminal's storage capacity (two 380,000-barrel storage tanks filled to a maximum of 360,000 barrels each). The other four tanks are proposed to supply other company's refineries (e.g., Shell, Phillips, Chevron, Exxon, BP, Petrostar, etc.).

Tesoro Savage does not plan to source or own any crude oil, nor arrange for the rail transportation of crude oil to the terminal or for tanker transportation from the terminal.[10] Tesoro Savage only proposes to handle crude oil at the terminal that is arranged by its customers. There is considerable uncertainty in the DEIS about the source, rail route, and tanker fleet configuration that would actually be used to supply and service the facility. The DEIS speculates that if built, the terminal may have customers that may be interested in shipping oil from the North America mid-continent (e.g., North Dakota, Montana, Wyoming, Colorado, Utah) and Saskatchewan, Canada.[11] The DEIS speculates that Bakken, Niobrara, and Uinta oil is expected, although this may change over time, as production and market conditions change. The DEIS does not examine the risk or impact of transporting all these types of oil from all these possible locations. Instead, the DEIS is limited to an examination of Tesoro's proposed supply, which equates to only one-third of the proposed terminal throughput. The DEIS lacks evidence of a purpose and need for this terminal for approximately two-thirds of its proposed capacity, and does not provide a thorough analysis of the risk and consequences for oil supplied by the other potential customers.

[9] DEIS, Chapter 2, Page 2-74.
[10] DEIS, Executive Summary, Page E-4.
[11] DEIS, Executive Summary, Page ES-4.

The DEIS assumes the terminal would be primarily sourced by Bakken production from the mid-continent via the Burlington Northern Santa Fe (BNSF) railroad;[12] however, current low oil prices have dramatically reduced Bakken oil development. Oil transported by rail from other locations may not use BNSF rails, creating further uncertainty in the assumptions used in the railroad risk assessment and response plan.

The DEIS does not examine the current or future predicted oil price, nor adequately examine the availability of the proposed crude oil supplies, and need for transportation during low oil prices. Both Bakken crude oil and Canadian tar sand oil production will be significantly impacted, and production will decline at low oil prices. The basis for the Proposed Action is that there may be insufficient rail and pipeline capacity (over land) to transport these crude oil supplies to a refinery. This assumption needs further justification in light of current and forecasted oil markets.

5. Alternatives to the Proposed Project

The DEIS examined six alternatives to the proposed project: (1) delivery of crude oil to the proposed facility by tanker truck, (2) delivery of crude oil to the proposed facility by barge, (3) alternative sites for the proposed facility, (4) alternative site layouts for the proposed facility, (5) a reduced capacity alternative, and (6) No Action Alternative.[13] The DEIS concluded:

> *No alternatives were found to clearly show a lower environmental cost or decreased level of environmental degradation than the Proposed Action.*[14]

The DEIS also concluded:

> *A reduced capacity alternative would not represent a lower environmental cost or decreased level of environmental degradation at the Port site compared to the Proposed Action because the same facility elements would be built at the site.*[15]

These conclusions are unsubstantiated. A reduced capacity alternative would reduce the number of railcars transits to the facility and number of railcars unloaded at the terminal. This would reduce the risk of a railcar accident on its way to the facility and the transfer risk during unloading at the facility. A reduction in railcar deliveries would in turn reduce the amount of rail car unloading facilities required at the terminal and reduce the number of transfer pipelines to the storage tanks. The number of storage tanks could also be decreased as well as the number of tanker transits. The number of incidents would typically decrease in proportion to the corresponding throughput reduction.

The reduced capacity alternative did not examine, but should, the alternative of reducing the overall capacity by eliminating the higher risk, higher consequence handling and transportation of dilute bitumen. This would eliminate the need to install and operate heated railcar unloading facilities, and heated tanks, and would substantially reduce the environmental risk of a spill of dilute bitumen into the Columbia River or Pacific Ocean that will likely sink or be submerged below the water surface and difficult to recover.

The reduced capacity alternative did not examine, but should, the alternative of reducing storage tank size to reduce the worst case spill potential. A lower throughput, may still require several different oil storage

[12] DEIS, Chapter 2, Page 2-65.
[13] DEIS, Executive Summary, Page E-5.
[14] DEIS, Executive Summary, Page E-5.
[15] DEIS, Chapter 2, Page 2-87.

tanks to segregate customer oil. However, a lower throughput option could consider installation of smaller storage tanks with a lower spill volume and lower consequences if spilled.

While the DEIS states the Applicant would still prefer to install six (6) 380,000 bbl tanks (storing up to 360,000 bbls each for a total storage capacity of 2,160,000 bbls), even if rail and tanker throughput is cut in half to accommodate periodic surges in capacity needs due to unplanned fluctuations in the timing of rail deliveries and marine vessel loading, the DEIS does not contain information to support the need to have five days of surplus storage.[16] A reduced capacity alternative could examine reducing the number of storage tanks to three or four, or six smaller tanks with two to three days of storage buffer.

The DEIS did not examine the reduction in tanker transits associated with a reduced capacity alternative and the reduction in on-water oil spill risk and river/marine impacts. In a reduced capacity alternate smaller tankers could be used to reduce the worst case spill related to a vessel accident (e.g., eliminating Aframax and Suezmax sized tankers that pose greater risk and a substantially larger worst case spill potential).

A reduced capacity alternative could examine placing the lowest risk crude oil type and volume on water for transportation, and reducing the volume to only the amount necessary to supply refineries (e.g., potentially Hawaii) that can't otherwise be supplied by oil production nearby with a lower overall transportation carbon footprint.

The No Action Alternative was rejected; it is not clear why. The DEIS concludes:

> *Under the No Action Alternative, the current demand by West Coast refineries for mid-continent North American crude oil would continue. This demand would require continued transport of crude oil by existing transportation modes (including pipelines, tanker trucks, and rail) from sources to refineries or from sources to new or expanded crude-by-rail terminals in other West Coast locations.*[17]

The DEIS does not provide sufficient reason to reject the No Action Alternative, especially for refineries located in Washington and California that can be supplied by existing or expanded over-land routes of transportation. The DEIS does not make the case that there is insufficient overland capacity to supply the refineries today especially in the current low oil price environment.

The Proposed Action involves four transfer steps: (1) production facility to railcar (overland transfer); (2) railcar to terminal (overland transfer); (3) terminal to tanker (overwater transfer); and (4) tanker to refinery (overwater transfer).

The No Action Alternative eliminates three transfer steps (railcar to terminal, terminal to tanker, and tanker to refinery). Transfer steps increase the potential for spills associated with human error and mechanical failure at the transfer point. Eliminating transfer steps reduces spill risk. Eliminating transfer steps overwater and eliminating crude oil transport by water (using overland transportation only) eliminates the risk of spill to the Columbia River and the Pacific Ocean along the Proposed Action route.

The No Action Alternative would include one overland transfer from the production facility to railcar/pipeline/or tanker truck and one overland transfer from that transportation method to the refinery. The DEIS does not make the case for rejecting the No Action Alternative, and appears to confirm there is

[16] DEIS, Chapter 2, Page 2-87.
[17] DEIS, Executive Summary, Page E-5.

existing on-land transportation methods that could supply Washington and California refineries with a lower spill risk.

Diluted bitumen is currently transported to Washington State refineries via pipeline (a majority) and railcar. The Proposed Action routes a persistent, low quality crude oil over water, where a spill to water would be nearly impossible to clean up because it will likely sink or submerge below the water surface.[18] Washington State Department of Ecology has identified the consequences of a diluted bitumen spill impact to be greater in a river because rivers (such as the Columbia River) have higher sediment load, shallower depths, and higher currents, which will all contribute to more rapid diluted bitumen submerging or sinking and impact to aquatic resources, especially fish spawning areas.[19] The DEIS provides insufficient justification on why the current transportation methods are inadequate or why a change needed.

Removing diluted bitumen as a source of crude oil for the proposed terminal will also substantially simplify the terminal design, eliminating the need to heat crude oil and provide separate railcar and tank storage and transportation infrastructure to segregate this product.

6. Vessel Response Plan

The DEIS includes a copy of the MFSA Vessel Response Plan (Appendix D.15). The DEIS states this plan is intended to provide an oil spill response plan for tanker vessels servicing the proposed Tesoro Savage terminal facility.[20]

The MFSA Vessel Response Plan covers a geographic area including the Columbia River from its mouth (river mile 0) to the Glenn Jackson Bridge (I-205, river mile 113), and the Willamette River from its confluence with the Columbia River up to Willamette Falls, and from the mouth of the Columbia River to 3 miles offshore into the Pacific Ocean.[21] The proposed terminal is located at mile 105 of the Columbia River.

MFSAs' plan confirms, "*response equipment contracted by MFSA does not meet all the regulatory spill response equipment requirements for the Ocean Zone.*"[22] The DEIS does not explain which Ocean Zone Response Plan tanker operators would be required to contract with to provide resources to clean up oil spilled to the Pacific Zone (outside of MFSA's plan). Therefore, the capability to clean up a spill that reaches the Pacific Ocean is not demonstrated. The EIS should require evidence of response capability in the Pacific Ocean beyond the area of MSFA coverage.

The MFSA Vessel Response Plan is based on a worst case discharge spill response capability of 300,000 barrels or refined product.[23] The DEIS includes a worse case spill volume of crude oil spilled from a tanker. The worst case spill volume starts with the entire cargo volume and reduces that volume to account for the Columbia River's 43' draft limit. The DEIS lists volumes for the entire vessel cargo, assuming a 43' draft limit, from 319,925 bbls (Handymax Oil Tanker) to 729,560 bbls (Suezmax Oil

[18] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Pages 21 and 38.
[19] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 38.
[20] DEIS, Appendix D.15, MFSA Vessel Response Plan.
[21] DEIS, Appendix D.15, MFSA Vessel Response Plan, Section 1.6.
[22] DEIS, Appendix D.15, MFSA Vessel Response Plan, Section 1.6.1.
[23] DEIS, Appendix D.15, MFSA Vessel Response Plan, Section 6.1

Tanker).[24] Therefore, the MFSA Vessel Response Plan capability to respond to a spill of 300,000 barrels of refined product on the Columbia River is insufficient to respond to a worst case spill from the largest crude oil tankers proposed to service this terminal of 729,560 barrels.

Section 6.1 of the MFSA Vessel Response Plan states:

> *MFSA planning standards are calculated for a WCD of 300,000 bbls. In order to accommodate a WCD of greater than 300,000 bbls, the planning standards would need to be re-evaluated and additional equipment addressed. Vessels transiting the Columbia River with ECD great than 300,000 bbls cannot be enrolled under the plan.*

The DEIS recommends the MFSA Vessel Response Plan be updated to "address a Handymax regulatory WCD volume of 319,925 bbl (Appendix J, Table 3)",[25] but is silent on the work needed to improve the plan to response to the largest Regulatory WCD for a Suezmax Oil Tanker listed in Appendix J, Table 3 of 729,560 bbls.

The DEIS also concludes:

> *The current Maritime Fire and Safety Association spill contingency plan is not designed to address spills greater than 300,000 bbls, and is primarily focused on addressing spills of refined petroleum products rather than crude oil. The new vessel traffic associated with the proposed Facility presents a new challenge on the Columbia River that has not been planned for to date.*[26]

The DEIS, Appendix J, Vessel Spill Risk Analysis estimates a 730,000 barrels Bakken Crude Oil WCD spill from the largest type of tanker proposed to service this facility would cover 224 miles of the Columbia River with a 0.1 mm thick fresh oil slick and an area of 157 square miles by Day 5 (hour 120) of the spill response.[27]

7. Vessel Spill Impact Assessment

The DEIS examines two different sets of Worst Case Discharges (WCDs) for vessel-related incidents: (1) WCDs set by federal and state regulation (labeled in the DEIS "Regulatory WCD"), and (2) substantially lower spill volumes estimated by the DEIS Consultants (Environmental Research Consulting and Herbert Engineering Corp.) using vessel outflow models (labeled in the DEIS as "Effective WCD"). While the DEIS lists the required Regulatory WCD for a vessel spill, its examination focused on the potential environmental impacts of the lesser spill volume for a vessel spill ("Effective WCD").[28]

The DEIS explains the difference between the "Regulatory WCD" and the "Effective WCD":

> *The "effective" WCD is the most credible or realistic volume for a worst-case discharge based on the amount of oil that would effectively be released in the event of a vessel impact accident (collision or grounding) based on maximum possible outflow as determining by modeling. This volume does not necessarily equate to the regulatory*

[24] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Table 3, Page 10.
[25] DEIS, Executive Summary, Page ES-17.
[26] DEIS, Chapter 5, Page 5-54.
[27] DEIS, Appendix J, Tables 21 and 22, Page 22.
[28] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Page 8.

> *WCD, which is the entire vessel cargo, because all of the oil would not flow out of the vessel but rather become entrapped between double hulls or other areas of the ship rather than be released to the environment. While regulatory requirements for contingency planning stipulate that response plans must be developed for the entire cargo of a vessel, the "effective" worst-case discharge is applied in this analysis for evaluating potential worst-case environmental impacts of a spill.*[29]

WCDs for vessel spills to water set by state (WAC § 173-182-030) and federal (33 CFR § 155.1020) regulations are based on the worst case spills that have occurred in past history (the entire cargo), to ensure there is sufficient oil spill response personnel and equipment available to clean up the worst case discharge that could occur. While the DEIS Consultant's models assume that some oil may be trapped aboard a leaking tanker in the double hull or other areas of the ship, there is no guarantee this will occur. For example, a double hull may breach during a tanker grounding, the tanker may break into two, or sink. For this reason, both state and federal regulations require the worst case spill volume for a vessel spill to be equal to a potential spill of the entire cargo.

Regulatory WCD volumes for a vessel spill listed in the DEIS start with the entire cargo volume, and then reduce the volume to account for the Columbia River's 43' draft limit. The DEIS lists volumes for the entire vessel cargo, assuming a 43' draft limit, from 319,925 bbls (Handymax Oil Tanker) to 729,560 bbls (Suezmax Oil Tanker).[30] WAC 173-182-030 (67) defines a worst case spill for a vessel to be a spill of the vessel's entire cargo and fuel, complicated by adverse weather. In this case, the worst case tanker spill volume would be 729,560 bbls.

The Effective WCD for a vessel spill estimated by the DEIS Consultants assumes the largest actual spills from tank vessels might occur during an impact accident (e.g., groundings (bottom impact) and collisions (side impact)).[31] The DEIS estimated the "Effective WCD" to be 89,554 bbls (Handymax Oil Tanker) to 184,380 bbls (Suezmax Oil Tanker) by assuming no bunker fuel would be spilled and only a fraction of the cargo tanks would leak.[32] Each oil tanker type examined in this DEIS has 12 cargo tanks and two (2) bunker fuel tanks. If the double hull is breached during an impact accident, the amount of cargo or bunker fuel spilled will be a function of the number and type of tanks breached. Therefore, the vessel oil spill risk and environmental impact assessment was based on the DEIS Consultants' recommendation to assume that only ¼ of the entire crude oil cargo might be spilled in a worst-case scenario, catastrophic accident. The smaller "Effective WCD" volumes for vessel spills were used in Chapter 4 to examine oil spill scenario impacts.[33]

The environmental impact (consequences) of spilling an entire tanker's cargo (Regulatory WCD) was only briefly examined in Appendix J, Tables 20 and 21. The consequence of a 729,560 bbl spill was not thoroughly evaluated. Nor was the consequence of spilling more than one tanker's cargo examined (e.g., multiple tanker collision).

The Effective WCD for a vessel spill is orders of magnitude smaller than the Regulatory WCD for a vessel spill and underestimates the risk and environmental impact in the DEIS of a worst case discharge for a single tanker accident (tanker grounding and capsize) or the collision of two tankers. The DEIS does not provide sufficient data to support a four-fold reduction in the worst case discharge environmental impact assessment.

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[29] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Page 9.
[30] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Table 3, Page 10.
[31] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Page 10.
[32] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Table 3, Pages 12 and 16.
[33] DEIS, Chapter 4, Table 4-14, Page 4-55.

Because it is possible for a tanker to run aground and breach the double hull and cargo tanks, or sink and lose its entire contents, both state and federal regulations require sufficient oil spill response personnel and equipment available to clean up the worst case discharge that could occur (the entire cargo). Therefore, the DEIS should examine both the risk and consequences of spilling the entire cargo into the Columbia River, not just a fraction of the cargo that might spill based on a series of potential impact scenarios, that might occur.

Historical tanker spills show that spills can and do occur that exceed ¼ of the cargo contents (for a single tanker accident). For example:

- In 2002, the Prestige Oil Tanker carrying 77,000 tonnes of heavy fuel oil suffered hull damage, developed a severe list and drifted towards the coastline. Salvor attempts to minimize stress on the vessel hull were unsuccessful and the tanker broke in two. It is estimated that 63,000 tonnes of oil were spilled (82% of the cargo).[34]

- In 1996, the Sea Empress Tanker carrying 130,000 tonnes of crude oil ran aground and suffered hull damage. Attempts to remove oil from the tanker were thwarted by severe weather. It is estimated that 72,000 tonnes of oil were spilled (55% of the cargo) and 370 tonnes of heavy fuel oil.[35]

- In 1993, the Braer Tanker carrying 84,700 tonnes of crude oil ran aground. The tanker broke apart and the entire cargo was spilled to the sea. It is estimated that 84,700 tonnes of oil (100% of the cargo) and 1,500 tonnes of heavy bunker oil were spilled.[36]

- In 1992, the Aegean Sea Tanker carrying 80,000 tonnes of crude oil ran aground. The tanker broke in two and caught fire. It is estimated that 73,000 tonnes of oil were spilled (91% of the cargo).[37]

- In 1991, the ABT Summer Tanker carrying 260,000 tonnes of crude oil exploded and sank; 100% of the cargo was lost to the sea or burned in the explosion.[38]

- In 1988, the Odyssey Tanker carrying 132,000 tonnes of crude oil broke in two and sank, spilling 100% of the cargo.[39]

- In 1975, the Jakob Maersk Tanker carrying 88,000 tonnes of crude oil ran aground while attempting to dock with the aid of tugs. Oil entered the engine room resulting in explosion and

[34] International Tanker Owners Pollution Federation Limited, http://www.itopf.com/in-action/case-studies/case-study/prestige-spainfrance-2002/, accessed January 2, 2016.
[35] International Tanker Owners Pollution Federation Limited, http://www.itopf.com/in-action/case-studies/case-study/sea-empress-milford-haven-wales-uk-1996/, accessed January 2, 2016.
[36] International Tanker Owners Pollution Federation Limited, http://www.itopf.com/in-action/case-studies/case-study/braer-uk-1993/, accessed January 2, 2016.
[37] International Tanker Owners Pollution Federation Limited, http://www.itopf.com/in-action/case-studies/case-study/aegan-sea-spain-1992/, accessed January 2, 2016.
[38] International Tanker Owners Pollution Federation Limited, http://www.itopf.com/in-action/case-studies/case-study/abt-summer-off-angola-1991/, accessed January 2, 2016.
[39] International Tanker Owners Pollution Federation Limited, http://www.itopf.com/in-action/case-studies/case-study/odyssey-off-canada-1988/, accessed January 2, 2016.

fire. It is estimated that approximately half the oil was consumed in the fire and the rest was spilled to the ocean (100% of the cargo).[40]

The DEIS examined the potential environmental impact of two Suezmax Oil Tankers colliding. If both tankers sunk and lost their maximum tank contents (assuming a maximum 43' draft fill limit), the total potential vessel spill would be 1,459,120 barrels, (maximum potential spill of 729,560 bbls for each tanker). However, the DEIS impact modeling estimates a collision of two Suezmax Oil Tankers would only spill 220,678 barrels, only 15% of the total volume on each tanker. The lower worst case spill estimate of 220,678 barrels was estimated by assuming that only a small portion of each tanker's cargo and fuel tanks would be breached. The DEIS assumes there would only typically be one Suezmax tanker in the system at a time; yet, the Proposed Action or proposed mitigation measures do not limit the number of tankers in the system at any one time.[41]

Double hull tankers will be used. The use of double hull tankers is an excellent oil spill mitigation strategy, because it is possible in some scenarios that the double hull of the vessel may be penetrated without loss of cargo, and it is possible that the rate of oil outflow from a double hull tanker may be less than other tanker designs. However, a double hull tanker can ground, sink, catch fire or be involved in a collision or other catastrophic accident. It is possible that more than ¼ of the cargo may be lost even if a double hull is present. A double hull not guarantee the vessel will not sink or break apart.

In summary, the EIS should provide oil spill trajectories and estimates of the potential environmental impact of spilling the entire vessel cargo, as required by state (WAC § 173-182-030) and federal (33 CFR § 155.1020) regulation from 319,925 bbls (Handymax Oil Tanker) to 729,560 bbls (Suezmax Oil Tanker).[42] The EIS currently underestimates the environmental impact of a tanker oil spill by a factor of four, by assuming the "effective" worst case spill volume from a vessel will be only 1/4th the maximum cargo volume.

8. Oil Spill Consequence Analysis

Oil spill risk assessments examine the probability of a spill occurring and the consequences of the spill. Spill risk is a function of probability and consequences (spill risk = spill probability x spill consequences). Therefore, spill risk increases commensurate with increases in spill consequences. This Proposed Action has high spill consequences.

The DEIS consequence analysis is incomplete. The DEIS concludes there is a low probability of an oil spill, but doesn't provide a thorough assessment of the consequences of a spill if one were to occur. The adverse consequences of a spill releasing a large volume of oil into the Columbia River or Pacific Ocean (especially diluted bitumen) would be extensive.

The most significant problem with Chapter 4 of the DEIS, is that it only examines the consequences of a worst case vessel spill up to 192,144 bbls (Table 4-14); however, the largest spill would be 729,560 bbls (Suezmax Oil Tanker). Therefore, the entire Chapter 4.7 (Resource-Specific Impact Analysis) is underestimated by several orders of magnitude.

[40] International Tanker Owners Pollution Federation Limited, http://www.itopf.com/in-action/case-studies/case-study/jakob-maersk-leixoes-portugal-1975/, accessed January 2, 2016.
[41] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Table 3, Page 16.
[42] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Table 3, Page 10.

A worst case tanker spill of 729,560 barrels is a very large oil spill. The Exxon Valdez Oil spill was at least 11,000,000 gallons (262,000 bbls). Therefore, the worst case spill for the Proposed Action could be several orders of magnitude larger than the Exxon Valdez Oil spill, a very large, significant oil spill with high consequences.

One way to reduce risk is to mitigate the probability of a spill from occurring to eliminate the potential for adverse consequences. For example, diluted bitumen should not be handled at this proposed terminal to eliminate the probability of a diluted bitumen spill on the Columbia River or in the Pacific Ocean.

Another way to reduce the probability of a spill is to refine crude oil closer to the production source. Shortening the transportation route also reduces the carbon footprint of transporting each barrel. For example, oil produced in Alaska should be routed to Alaskan refineries first, rather than shipped from North Dakota and Alberta, Canada by tanker all the way back to Alaska.

This DEIS provides estimates for the worst case spill volume that might occur from rail transport in Washington State, terminal storage and river/marine transport by tanker while shipping an estimated 360,000 barrel of oil per day. However, the DEIS does not provide a comprehensive potential consequence analysis. Instead, the modeled oil scenario trajectory maps are limited to the first 48 hours of a spill from the terminal facility at mile 105 of the Columbia River, from a terminal oil storage tank leak of 360,000 barrels, a short-term two-day trajectory model is inadequate to estimate the potential consequences of a major oil spill that will continue to spread and impact a larger area before it is cleaned up. Chapter 4 provides some insight to the expected distance the oil might travel, concluding the oil would likely contaminate the Columbia River from 5 miles above the terminal (Mile 110) to the mouth of the Columbia River and then 100 miles in either direction (north and south) along the Washington and Oregon coastlines.[43] The DEIS briefly acknowledges the increased risk of spills along the ocean route to various West Coast, Alaska, and Hawaii refineries, but does not examine the impacts or consequences of this spill risk compared to a No Action Alternative.[44] The modeled oil scenario trajectory maps are not informative about the scale of potential impacts, and the trajectory models are not used to evaluate potential consequences of a major marine oil spill. A consequence analysis that considered the spill trajectories against local wildlife, human use, and environmental sensitivities would inform the overall project risks.

The DEIS lacks a comprehensive accounting of the potential impacts to the aquatic ecosystem, wildlife resources human use, and economic impacts to other industrial uses of river and ocean systems. For example, there are drinking water intakes along the Columbia River for Kennewick, Longview, Pasco, and Richland that would be at risk of contamination.[45] A spill could pollute the river, and the marine waters off the coast of Washington and could result in acute and long-term adverse fisheries impacts. And, the oil spill response trajectory appears to assume response resources will be deployed faster than committed to in the proposed oil spill plan.

There is no oil spill trajectory showing the route or consequences of a major tanker collision, allision or grounding along the tanker route. The DEIS, Appendix J, Vessel Spill Risk Analysis specifically excludes a complete consequence analysis, by clearly stating that "*trajectory, fate, and effects modeling for specific spill scenarios related to Vancouver Energy vessel traffic is outside the scope of the current*

[43] DEIS, Chapter 4, Page 4-20.
[44] DEIS, Chapter 4, Section 4.4.3, Page 4-29.
[45] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 35.

study."[46] Appendix J does provide some estimates of the number of square miles and river miles that might be contaminated.

Appendix J, Table 21 estimates the spread of Bakken crude oil on the Columbia River water surface for spill sizes ranging from one barrel to 730,000 bbls. There are no corresponding maps to show the cumulative impact area from a spill of 730,000 bbls. Instead, the DEIS only lists estimated distances of impact in a table format. For example, Table 20 estimated the Regulatory WCD spill of 730,000 bbls would cover an area of 157 square miles and 224 river miles with a 0.1mm thick fresh Bakken crude oil slick, and would cover an area of 51,907 square miles and 74,153 river miles with a 0.0003 mm thick rainbow oil sheen. There are no corresponding oil spill trajectory maps to show the route the oil would take and how these estimated areas of contamination translate into actual impacted areas along the spill trajectory. The Columbia River is 1,243 miles long. Estimates concluding that that a WCD spill would contaminate 74,153 miles of a 1,243-mile-long river lack correlation of mathematical results to actual topography. Oil spill trajectory maps would show a spill of this size would not only contaminate the Columbia River, but would result in far-reaching oil spill contamination of the Pacific Ocean along the west coast. The magnitude and consequences of this potential spill risk need to be examined, but are not. Oil spill trajectory maps are needed to better understand which resources will actually be impacted along the oil spill trajectory route, before the oil can be cleaned up.

Table 21 assumes that only 35% of the oil will remain after 120 hours. The paragraph preceding Table 20 states the spill analysis examined the amount of oil remaining after evaporation and dispersion were considered. Appendix J does not provide data to support a 65% evaporation and dispersion rate for Bakken crude oil, and may under-estimate the potential impact.

Oil spill trajectory analyses are conducted to evaluate the vulnerability of sensitive resources and environmental receptors in the path of a potential spill. The trajectory provides information on the potential on-water concentrations and shoreline distribution of oil contaminated areas; however, the trajectory analysis alone does not yield the potential consequences of oil reaching these areas.

A consequence analysis is needed to assign weight to the vulnerability of sensitive resources and environmental receptors in the path of a spill. The consequence analysis can then be used to identify whether sufficient personnel and equipment resources have been assigned to combat the spill response, and protect sensitive areas ahead of the spill trajectory, and to identify additional mitigation measures. A consequence analysis can also help inform whether consequence of a major spill from this proposed facility is an acceptable risk, or whether a no-action alternative is a preferred alternative.

Absent a thorough consequence analysis, this DEIS lacks the necessary information to inform regulators and the public of the potential consequence of a major rail, terminal or tanker spill to the Columbia River region.

9. Railroad Oil Spill Contingency Planning

Washington State is in the process of developing rules for railroads transporting oil in bulk though the state.[47] Washington is concerned that federal contingency plans for railroads transporting oil in bulk are

[46] DEIS, Appendix J, Vessel Spill Risk Analysis, Page 45.
[47] http://www.ecy.wa.gov/programs/spills/OilMovement/OilSpillContPlanning.html, Accessed January 4, 2016.

insufficient to mitigate the potential risk. Additionally, Washington State has not established financial responsibility for oil handling facilities including rail transportation.[48]

The federal government is also concerned that existing federal regulations are insufficient to prevent railroad accidents during crude oil shipments that have increased by over 400% in recent years.[49] In May 2015, the DOT concluded that absent federal regulatory improvements to mitigate damages of rail accidents involving flammable liquids, damages based on the historical safety record could range from $4.1 billion to $12.6 billion over a 20-year period.[50]

The Proposed Project anticipates rail deliveries of 120 cars of 750 barrels[51] per car (31,500 gallons each). Federal regulations (49 CFR § 130) require a very basic oil spill response plan for rail cars with a capacity of 3,500 gallons or more each. Comprehensive oil spill response plans are only required for railcars with individual capacities of 42,000 gallons or more each, meaning the more stringent comprehensive planning requirements would not apply to the proposed railcar traffic associated with this project.

The difference between a basic and comprehensive response plan is significant. A basic plan does not include: (1) requirements of the National Contingency Plan (40 CFR § 300) and Area Contingency Plans, (2) a Qualified Individual with the full authority to implement and financially authorize the removal action, (3) evidence of contracts with personnel and equipment to remove the WCD, and (4) written training and drill programs.

The DEIS lists oil spill prevention standards that have been voluntarily adopted by railroad operator BNSF, that go beyond the minimum federal standard. While Tesoro plans to ship its oil on BNSF rails, there is no guarantee that the remaining two-thirds of the facility customers will use BNSF rails or that BNSF's voluntary standards will be adhered to during the life of the facility. [52] Voluntary oil spill prevention standards adopted by BNSF (that exceed federal standards) should be required as standard mitigation measures for all railroad servicing the proposed terminal. (e.g., increased track inspections, speed restrictions, use of new safety technology).

The railway portion of the oil spill risk assessment concluded a train derailment is likely to occur every other year,[53] meaning 10 derailments might occur in the facility's 20-year estimated lifespan. The risk assessment also concluded at least one of the 10 derailments would result in a spill.

Washington could either postpone evaluation of this project until its rules for railroads transporting oil in bulk though the state is complete, or require the Applicant to voluntarily agree to meet the more comprehensive planning standards of 49 CFR § 130.

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[48] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 68.
[49] Department of Transportation, Pipeline and Hazardous Material Safety Administration, Final Regulatory Impact Analysis, [Docket No. PHMSA-2012-0082] (HM-251) Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains; Final Rule Office of Hazardous Material Safety, Final Regulatory Impact Analysis, May 2015, Page 5.
[50] Department of Transportation, Pipeline and Hazardous Material Safety Administration, Final Regulatory Impact Analysis, [Docket No. PHMSA-2012-0082] (HM-251) Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains; Final Rule Office of Hazardous Material Safety, Final Regulatory Impact Analysis, May 2015, Page 13.
[51] DEIS, Chapter 2, Page 2-1.
[52] DEIS, Chapter 4, Page 4-9.
[53] DEIS, Chapter 4, Page 4-28.

10. Railway Tank Car Standards

The DEIS states that all tank cars used to transport crude oil to the Vancouver Energy Distribution Terminal Facility would be required to meet the new May 1, 2015 U.S. Department of Transportation (DOT) Specification 117 tank car standards.[54] Specification 117 requires increased tank shell thickness, head shields at each end, improved protection for top fittings and discharge valves and reconfigured tank vents for automatic reclosing to reduce vulnerability of breaching or failure during derailments.

While DOT Specification 117 is a safety and spill risk mitigation improvement, this new standard only applies to construction of new tank cars constructed after October 1, 2015, and provides a ten year window for existing tank cars to be retrofitted by May 1, 2025.[55] There is no assurance in the DEIS that only new tank cars built to DOT Specification 117 standards, or existing tank cars retrofitted to DOT Specification 117 standards, would be used to service the Vancouver Energy Distribution Terminal Facility.[56] The terminal lifespan is estimated at 20 years; therefore, for half of the terminal lifespan, railcars servicing the terminal may not meet the new DOT Specification 117 if existing (non-retrofitted) tank cars are used as allowed under the ten-year upgrade provision of the rule.

As part of Specification 117, DOT confirmed existing tank car design is vulnerable to breaching or failure during derailments. Therefore, any use of existing tank car design to transport crude oil to the Vancouver Energy Distribution Terminal Facility, poses an increased risk that can be mitigated, by limiting the use of tank cars to only those tank cars meeting the new Specification 117 standard.

The EIS should require that all tank cars used to transport crude oil to the Vancouver Energy Distribution Terminal Facility be a new tank car constructed to meet the DOT Specification 117 standards, or existing tank cars be retrofitted to meet DOT Specification 117 standards. Existing tank cars, not upgraded to the DOT Specification 117 should be prohibited to mitigate the risk of breaching or failing during a derailment.

11. Seismic Risk

The proposed terminal location is subject to seismic hazards including ground motion and ground failure triggered by soil liquefaction (settlement, lateral spreading, landslides into the Columbia River).[57] Terminal infrastructure built on soil that may behave like a liquid ("liquefaction") during an earthquake and can be severely damaged.

The DEIS reports the largest historical earthquake within 20 miles of the proposed facility was a moment magnitude of 6.3 (in 1877), followed by three earthquakes of moment magnitudes of 5.0 to 5.9 in 1964, within 5.5 miles of the proposed facility.[58] The DEIS also reports there is "abundant geological evidence to support the occurrence of prehistoric, great magnitude megathrust earthquakes" in this area.[59] The DEIS estimates that converging tectonic plates[60] offshore Oregon and Washington have the potential to generate earthquakes with moment magnitudes greater than eight (8.0).[61]

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[54] DEIS, Executive Summary, Page ES-2.
[55] DEIS, Chapter 4, Page 4-7.
[56] DEIS, Chapter 4, Page 4-7.
[57] DEIS, Appendix C, Evaluation of Seismic Hazards at Proposed Vancouver Energy Oil Export Terminal, Page 1-1.
[58] DEIS, Appendix C, Evaluation of Seismic Hazards at Proposed Vancouver Energy Oil Export Terminal, Page 3-1.
[59] DEIS, Appendix C, Evaluation of Seismic Hazards at Proposed Vancouver Energy Oil Export Terminal, Page 3-2.
[60] Pacific Plate and the Juan de Fuca Plate.
[61] DEIS, Appendix C, Evaluation of Seismic Hazards at Proposed Vancouver Energy Oil Export Terminal, Page 2-2.

The seismic risk and potential consequences are significant. To mitigate this risk, the Applicant proposes construction design methods to mitigate infrastructure failure during an earthquake, and the DEIS Consultant (AECOM) proposed additional mitigation. These measures will mitigate but not eliminate risk. Therefore, a primary question is whether placement of an oil terminal in an area where the potential for great magnitude megathrust earthquakes of moment magnitudes greater than 8.0 is a safe, and prudent choice.

Large earthquakes pose the risk of simultaneously damaging multiple tanks at a storage terminal. This risk is not examined in the DEIS. The DEIS and oil spill response plan (Appendix D.4, Section 7.1.8) recognizes the potential for a catastrophic failure of one or more large oil storage tanks, but does not examine the environmental impact of a multiple storage tank release to the Columbia River.

The Applicant proposes to install a secondary containment system (606,020 barrels) that is larger than the largest tank (380,000 barrels). However, the total terminal storage capacity is proposed to be 2,160,000 barrels and a multiple tank failure could overwhelm the secondary containment system leaking oil into the Columbia River, even if it did stay structurally intact during a large earthquake.[62]

To address the possibility of soil liquefaction during a seismic event under the large 240' diameter crude oil storage tanks, the Applicant's engineer (HBI) proposed to install 3' diameter stone columns on a square grid spaced 8.2' apart to depths of 35-40'.[63] AECOM recommends improvement in the Applicant's proposed secondary containment berm design to contain a tank spill; however, strengthening the berm, will not ensure the remainder of the secondary containment system will be intact and impermeable to contain the spilled oil. For example, the secondary containment liner connected to the tank foundation and secondary containment berm could tear.

While both AECOM and HBI conclude this design will provide sufficient mitigation, the DEIS does not examine alternative locations where the seismic risk is lower, and where extensive foundation work is not needed to support very large crude oil tanks during an earthquake. The EIS should examine safer, alternative locations for this terminal in order to have lower seismic risk.

The EIS should examine the potential for multiple tank and secondary containment failure and the resulting environmental consequences during a large earthquake.

12. Facility Hazard Evaluation/Risk Analysis

Appendix D.4, Sub-appendix D provides the Applicant's proposed Hazard Evaluation/Risk Analysis for the onshore portion of the facility risk.[64] This analysis concludes:

> *The possibility of a catastrophic discharge impacting state or navigable waters is extremely low due to the location of the terminal and strict adherence to established operating and maintenance procedures.*

The terminal is located approximately 1,800 feet from the Columbia River in a location with a potential for great magnitude megathrust earthquakes of moment magnitudes greater than 8.0. The hazard analysis states that roads and naturally occurring impoundments between the facility and river "should" provide containment and collection sites preventing oil from reaching the river. However, there is no topographic

[62] DEIS, Appendix D.4 (Sub-Appendix C), Page C-7.
[63] DEIS, Appendix C, Evaluation of Seismic Hazards at Proposed Vancouver Energy Oil Export Terminal, Page 5-4.
[64] DEIS, Appendix D.4, Sub-Appendix D, Page D-2.

map analysis provided to substantiate this claim. The hazard analysis is missing a mass balance computation to demonstrate the largest spill volume would actually be contained on land in naturally occurring containment and collection sites. The DEIS does not provide estimates of soil and groundwater contamination associated with a worst case spill volume that is retained on land, nor show the Applicant has sufficient resources to clean up a terrestrial spill of this magnitude.

The facility has not been built and there is no operating or maintenance history; therefore, a claim that the possibility of a catastrophic discharge impacting state or navigable waters is extremely low due to strict adherence to established operating and maintenance procedures is unsubstantiated because it is based on speculation about future procedural compliance.

The Terminal Hazard Evaluation/Risk Analysis concludes the total quantity of crude oil which could be discharged would not exceed 360,000 barrels.[65] The worst case discharge scenario for a spill from the terminal facility assumes a large earthquake results in the catastrophic release of the entire contents of one tank. The analysis does not provide any explanation as to why only one of the six similarly designed and constructed tanks would breach, while the others would not during the same earthquake event. If an earthquake was large enough to breach one tank, it would likely result in the failure of all six similarly designed and constructed tanks. The analysis does not address the potential for multiple tank failure, which is possible in a large earthquake, and could be the worst case spill for a seismically active site.

The risk assessment concludes oil spilled from the tank farm would be fully contained in the secondary containment.[66] However, the risk assessment does not include any assessment of the risk or consequences of secondary containment failure during a large earthquake. Yet, the DEIS Seismic Consultant (AECOM) identified the risk of secondary containment failure during a large earthquake in its analysis.[67]

The worst case oil spill scenario in the Hazard Evaluation/Risk Analysis includes a four paragraph narrative describing the method to develop a trajectory analysis. The Hazard Evaluation/Risk Analysis does not include any maps showing the expected distance and route the oil would travel, nor does it identify the expected number of miles of oil impacted coastline, or aquatic ecosystem and other wildlife impacts along the spill trajectory.

Outside the Hazard Evaluation/Risk Analysis the DEIS includes a 48 hour oil spill trajectory map (prepared by NJResources) that estimates a 360,000 barrel oil spill from the terminal (one tank, spilling at a rate of 15,000 barrels per hour with no wind and a river velocity of 1.2 knots) would contaminate 58 miles of the Columbia River within 48 hours.[68] This oil spill trajectory is limited to the first 48 hours of the spill and does not show the extent of oiled river and marine coastline that would actually occur during the full span of the oil spill response effort. The EIS should include an estimate of the time required to clean up the spill (total time in days to clean up a spill of this magnitude) and a time-elapse series of oil spill trajectories showing the path of spilled oil over time, as it travels until recovered. This information is needed to provide a complete assessment of the potential impacted area (river and marine coastline) while the spill response is underway, and until it is complete. The oil spill trajectory for the first 48 hours only provides a glimpse of the initial Columbia River impact, and not a complete assessment of the potential impact zone and environmental damage that would occur.

[65] DEIS, Appendix D.4, Sub-Appendix D, Page D-17.
[66] DEIS, Appendix D.4, Sub-Appendix D, Page D-14.
[67] DEIS, Appendix C, Evaluation of Seismic Hazards at Proposed Vancouver Energy Oil Export Terminal, Page 8-1.
[68] DEIS, Appendix D.4, NJResources Tesoro Vancouver Terminal Trajectory Planning, Page 1.

The NJResouces 48-hour Trajectory Planning assessment oil spill trajectory does not provide information on magnitude of damage or the environmental consequences within the first 48 hours. The NJResouces 48-hour Trajectory Planning assessment contains a very spare narrative. It is unclear whether this trajectory analysis assumes any oil recovery during the 48-hour period. The trajectory map appears to assume sensitive areas along the spill trajectory (GRPs) would be boomed prior to the oil spill reaching those locations; however, the DEIS plans do not appear to include sufficient dedicated personnel and resources to achieve this goal.

Hazard Evaluation/Risk Analysis worst case scenario assumes priority sites to boom off and protect environmentally sensitive areas can be initiated within the first five (5) hours of the spill and that CRC will supply six booming teams (24 responders and 12 boats), and that 46 boom sites can be completed in the next 60 hours.[69] Yet, in another section of the DEIS, the Applicant only offers to provide a contract with a spill cooperatives (CRC and MSRC) to provide non-dedicated workboats and personnel to implement environmental protection (e.g. deploy Geographic Response Plans (GRPs), skimming operations, and provide logistical support).[70] The Applicant only offers that "*such resource* ***could*** *arrive on scene beginning at 48 hours,*" not within the 5 hour period required to stay ahead of the oil slick for a WCD.[71]

13. Oil Spill Response Plan and Proposed Equipment Incomplete

A complete Facility Response Plan (FRP) is not available.[72]Appendix D.4 provides a placeholder for its Oil Spill Response Planning Standard Calculations, but does not provide this important information to verify it has sufficient response capability to response to Washington States Oil Spill Response Planning Standard.[73] Appendix D.4 provides the Applicant's proposed Operations Facility Oil Spill Contingency Plan. This plan is incomplete. For example, Figure 7.1[74] is intended for the Applicant to provide a list of on-site oil spill response equipment; however, this table does not provide any quantities of equipment or any information on equipment design or selection. Instead, the table lists all quantities and equipment design as "TBD"; therefore, it is not possible to determine if the proposed resources are sufficient.

Appendix D.4 provides the Applicant's proposed on-water equipment availability summary for a spill of the largest tank (380,000 barrels). Spills to water compound in size as oil-water emulsions are created when oil mixes with water in the receiving environment. The Applicant estimates oil and water emulsions may contain as much as 70% water and 30% oil. If the entire oil spill reaches water, an oil-water emulsion of over 1 billion barrels may result. There is insufficient information in the DEIS to show the Applicant, and its contractors have the capability to respond to a spill of this magnitude.

The Applicant's Figure 7.2 (Equipment Availability Summary)[75] proposes to have 58,127 barrels per day of skimmer capacity within 24 hours, building to 68,687 barrels per day by hour 48 with interim storage capacity of 137,400 barrels. The 24-hour skimming capacity proposed is only 16% of the total crude oil spill volume of 360,000 barrels. The Applicant recognizes that its contractor (CRC) has a limited amount of storage available for initial oil response. The plan states that CRC will work with its member companies to locate an additional 150,000 barrels of storage, but this plan is uncertain. The Applicant also proposes to seek additional waste storage capacity with vessels of opportunity, tank truck and railcars, but

[69] DEIS, Appendix D.4, Sub-Appendix D, Page D-18.
[70] DEIS, Appendix D.4, Page 7-8 and Appendix D.4 (Sub-Appendix B), Page B-1.
[71] DEIS, Appendix D.4 (Sub-Appendix B), Page B-1.
[72] DEIS, Chapter 4, Page 4-19.
[73] DEIS, Appendix D.4, Page 7-16 and 7-17.
[74] DEIS, Appendix D.4, Page 7-3.
[75] DEIS, Appendix D.4, Page 7-7.

this plan is also uncertain.[76] The Applicant contemplates use of the existing tank storage area for potential waste placement, but inventory management plans to ensure available space are not included, nor are logistic plans to transfer waste from on water recovery systems, uphill to the undamaged tanks in the proposed onshore tank farm. Overall more work is needed to ensure there is a well-defined and reliable waste storage plan in place.

The Applicant offers to provide a contract with spill cooperatives (CRC and MSRC) to provide non-dedicated workboats and personnel to implement environmental protection (e.g., deploy Geographic Response Plans (GRPs)), to provide skimming operations, and provide logistical support.[77] The Applicant only offers that "*such resources **could** arrive on scene beginning at 48 hours*."[78] This proposal is insufficient. Dedicated oil spill response equipment and personnel should be assigned to this project. A delay in implementing GRPs and protecting environmentally sensitive areas and achieving source control will result in oil spreading and contaminating the shoreline and sensitive areas along the Columbia River coastline that could be prevented with more immediate response. The Applicant did not provide evidence of a contract with Clean Rivers Cooperative, Inc. (CRC) or with a diving or salvage contractor.[79]

As explained in the Applicant's plan, the proposed facility is located in an area that is not pre-approved for dispersant or in-situ burning, and the Applicant does not plan to implement either of these alternative strategies unless directed by Unified Command. Therefore, it is critical there is sufficient dedicated mechanical response equipment sufficient to respond to the worst case spill volume.

For contingency planning purposes, WAC 173-182-030 (67) defines a worst case spill for an onshore facility to be the entire volume of the largest above ground storage tank on the facility site complicated by adverse weather conditions, unless the state determines that a larger or smaller volume is more appropriate given a particular facility's site characteristics and storage, production, and transfer capacity." The EIS should contain an oil spill response plan that demonstrates the capability to respond to a catastrophic discharge of multiple storage tanks due to the seismic risk at the proposed facility location and the potential for a multiple tank failure scenario.

The EIS should contain a complete oil spill response plan with sufficient, dedicated personnel, equipment and contracts to rapidly respond to a multiple tank spill and protect sensitive resources in a timely manner.

14. Cumulative Oil Spill Risk Analysis

The DEIS discusses and presents the project risks in a very compartmentalized manner. Individual probabilities are calculated for spills from rail, terminal, or vessel operations for each project. Cumulative risks are described for specific scenarios for each phase of operations, but these probability estimates are never aggregated. Aggregate probability of events that are not mutually exclusive can be estimated by summing up the individual probabilities; however, this is not done.

Chapter 4, states there is "*insufficient data on spill frequencies from terminals similar to the proposed Facility to support a meaningful statistically analysis of the likelihood for spills of various sizes resulting*

[76] DEIS, Appendix D.4, Page 7-13.
[77] DEIS, Appendix D.4, Page 7-8 and Appendix D.4 (Sub-Appendix B), Page B-1.
[78] DEIS, Appendix D.4 (Sub-Appendix B), Page B-1.
[79] DEIS, Appendix D.4 (Sub-Appendix B), Page B-2.

from its operation."[80] Therefore, no specific accident or spill frequencies are estimated to use in a cumulative risk analysis case combining rail, terminal, and vessel risk.
Appendix D.4, Sub-appendix D provides the Applicant's proposed Hazard Evaluation/Risk Analysis for only the onshore portion of the facility risk.[81] This hazard evaluation does not examine the cumulative oil spill risk that will occur if new terminal facility is built and railroad transit to the facility occurs and tanker traffic increases on the Columbia River.

Appendix J provides a separate Vessel Risk Analysis and Appendix E provides a Railroad Risk Analysis. The DEIS does not integrate the Appendix D, E, and J risk assessments to provide a cumulative oil spill risk and hazard risk assessment, nor does it provide a consequence analysis of the cumulative risk and hazards presented by the proposed activity. Chapter 5, "Cumulative Impact Analysis", includes only one page on the cumulative impact of a rail, terminal, or tanker accident.[82]

While the DEIS never compiles a cumulative impact risk assessment (rail, terminal, and tanker), it attempts to arrive at a cumulative impact conclusion with conflicting results.

First the DEIS concludes:

> ***No significant (moderate to major) cumulative impacts were identified*** *for the proposed Facility in combination with past, present, and reasonably foreseeable future actions.*[83] *[Emphasis added].*

Later the DEIS provides a contradictory conclusion that confirms seismic risk (even with the Applicant's proposed earthquake design improvements) could result in moderate to major impacts:

> *Given the potential for soil liquefaction from a large seismic event at the proposed Facility site, even with the implementation of the Applicant's proposed ground improvements,* ***impacts from these earthquake hazards could range from moderate to major***.[84] *[Emphasis added].*

The DEIS also concludes that seismic risk could result in **moderate** impacts due to a possible train derailment.[85] And, an "*increase in the number of trains transporting crude oil… could result in an increased risk of derailment, in turn causing an increased risk of spills, fires, or explosions…*".[86]

The DEIS also concludes that seismic risk could result in **major impacts** to vessels located in shallow water:

> *Seismic hazards along the vessel corridor occur near the Columbia River mouth and offshore along the marine transportation route. These hazards include tsunami and seiche waver generated by large earthquakes…Impacts from these waves to vessels in the nearshore shallow-water environment could be* ***major****…As these waves approach shallow water, however, wave amplitudes increase substantially and the rise in seafloor topography causes the waves to increase in height. In the event of a tsunami, a vessel*

[80] DEIS, Chapter 4, Page 4-24.
[81] DEIS, Appendix D.4, Sub-Appendix D, Page D-1.
[82] DEIS, Chapter 5, Page 5-54.
[83] DEIS, Executive Summary, Page ES-9.
[84] DEIS, Executive Summary, Page ES-13.
[85] DEIS, Executive Summary, Page ES-13.
[86] DEIS, Chapter 5, Page 5-54.

> *could be inundated, grounded on the river bottom, pushed out of the navigation channel, or capsized from the wave.*[87]

The DEIS also concludes "*an increase in the number of vessels transporting crude oil… would likely result in an increased risk of accident, in turn causing an increased risk of spills, fires, or explosions since a greater number of vessels would carry crude oil through the Columbia River…*".[88]

Additionally, Chapter 4.7 lists a number of possible moderate to major risks.

The EIS should include a cumulative risk assessment that combines the increased oil spill and hazard risk assessment from increased railroad traffic (Appendix E), the newly proposed terminal facility (Appendix D), and the increased tanker traffic (Appendix J). The EIS should provide a consequence analysis of the cumulative risk and hazards presented by the proposed activity.

For example, the aggregate probability of events that are not mutually exclusive can be estimated by summing up the individual probabilities. If one was interested in understanding the potential for any spill from the railway, the terminal, or the tankers to impact the environment, the individual probabilities could be added together.

- Appendix E, Tables 6 and 21 estimate the cumulative oil spill frequency for railcars at 0.0826 per year (at least one spill every 12.1 years).[89]
- Appendix J, Table 20 estimates the cumulative oil spill frequency for transfer-related (dockside) transfers at 0.0949 per year (at least one spill every 10.5 years).[90]
- Appendix J, Table 17 estimates the cumulative oil spill frequency for spills from vessels involved in accidents while underway at 0.0496 per year (at least one spill every 20 years).[91]
- Chapter 4, states there is "insufficient data on spill frequencies from terminals similar to the proposed Facility to support a meaningful statistically analysis of the likelihood for spills of various sizes resulting from its operation."[92] This risk is underestimated due to the lack of data.

The additive probability – the chance that any of these types of spills might occur if the Proposed Action were approved sums to a combined oil spill frequency risk of 0.2271 per year. **Therefore, the combined chance of any size spill impacting the environment in a given year is estimated at 23% from the rail, terminal, or vessels servicing the terminal, equates to a spill once every 4.4 years.**

15. Tanker Traffic Increase

The DEIS estimates that 280 tank vessels currently move in and out of the Columbia River per year. Tesoro Savage proposes to add 365 tank vessels per year, more than doubling the amount of tanker traffic, and significantly increasing the tanker size for the 20% of the fleet that is proposed to include Aframax and Suezmax sized tankers. Each tank vessel coming into the Columbia River involves two transits (one inbound, and one outbound). Therefore, if this project is approved, there would be 645 inbound tanker transits and 645 outbound tanker transits per year, equivalent to approximately three to

[87] DEIS, Executive Summary, Page ES-13.
[88] DEIS, Chapter 5, Page 5-54.
[89] DEIS, Appendix E, Pages 14 and 37.
[90] DEIS, Appendix J, Page 21. Adding spill frequencies of all spill sizes.
[91] DEIS, Appendix J, Page 18.
[92] DEIS, Chapter 4, Page 4-24.

four tankers in the river on a daily basis.

While the DEIS estimates the tanker fleet would be comprised of no more than 365 tankers per year (80% Handymax, 15% Aframax, and 5% Suezmax tankers) there is no corresponding limit set in the proposed mitigation measures limiting the number or type of tankers that would actually be allowed if the project was approved.

The Washington State Department of Ecology's October 2014 Report states:

> *Tanker sizes are currently limited to 125,000 DWT by regulation (in Washington). Ship size is also limited by navigational restrictions in BP, Grays Harbor and Columbia River.*[93]

Therefore, the proposal to allow 165,000 DWT Suezmax tankers to service the Tesoro Savage terminal on the Columbia River appears to conflict with current regulation and navigational restrictions for the Columbia River. And, the Columbia River Spill Cooperative is only prepared to respond to a vessel spill of up to 300,000 barrels of refined product (not crude oil).

The DEIS does not contain a comprehensive vessel traffic risk assessment for the Columbia River. Therefore, the relative risk (probability and consequence) of a vessel incident resulting in damage to vessels transiting the Columbia River, and the potential for an associated oil spill occurring in the Columbia River based on the increased number of tanker transits has not been studied. Instead the DEIS, merely assumes accident statistics will remain at or below historic levels that occurred with less than half the number of vessel transits on the Columbia River.

The Washington State Department of Ecology plans to conduct a vessel traffic safety evaluation and assessment for the Columbia River that would examine the increase in rail to tanker traffic on the river; however, this study is just beginning and will not be complete until 2018.[94] ESHB 1449 requires that Ecology evaluate vessel traffic management and safety within and near the mouth of the Columbia River. A draft evaluation and assessment of vessel traffic management and safety, including tug escort requirements, escort tug capabilities, and best achievable protection, must be submitted to the Washington state legislature by December 15, 2017, with a final report to be completed by June 30, 2018.[95] The EIS should await the results of this work, or the Applicant should prepare its own study on a more accelerated pace to meet this project's need.

The Columbia River mouth bar is a risky crossing, especially during winter storms and large tide changes. The DEIS risk assessment does not provide a comprehensive assessment of this risk, nor offer proposed mitigation strategies. For example, the EIS could consider constraints in time periods when vessels can arrive at the Columbia River Bar in conditions suitable to departure without having to anchor or loiter and in consideration of potential weather closures.

Risk reduction alternatives such as reduced tanker transit frequency, the use of tug escorts and the types of tugs needed to safely escort large tankers, alternative routing and tanker transit timing strategies to avoid grounding in shallow areas of the river (etc.) have not been analyzed.

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[93] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 55.
[94] http://www.ecy.wa.gov/programs/spills/OilMovement/RiskAssessment.html
[95] DEIS, Chapter 4, Page 4-6.

16. Vessel Spill Probabilities

The DEIS used historic tank vessel traffic accident statistics for the Columbia River (1990-2011) to estimate the probability of future accidents.[96] The DEIS does not examine the potential for accidents to increase when the number of tanker transits is more than doubled (from the baseline of 280 tanker round trips per year to 645 tanker round trips if this project is approved). Using historical tank vessel traffic accident statistics based on 280 tanker calls per year, to predict future accident statistics on the Columbia River when the tanker vessel traffic will be more than doubled to 645 tanker calls per year underestimates the accident risk and frequency as more tankers are traveling up and down the Columbia River. If this project is approved, there would be 645 inbound tanker transits and 645 outbound tanker transits per year, equivalent to approximately three to four tankers in the river on a daily basis. The number of traffic accidents will likely increase above the current baseline, especially the potential number of vessel to vessel collisions.

Historic tank vessel traffic accident statistics listed in Appendix J, Table 16 are based on 280 tank vessel round trips per year or less. Table 16 data shows that over a 21-year period (1999-2011) an accident occurred once every 377 tank vessel round trip. The DEIS does not examine or estimate the potential for accidents to increase when tanker traffic more than doubles. The DEIS assumes historic tank vessel accident statistics will remain static, but provides no basis for this assumption.

The lifespan of the facility is estimated at 20 years. If all historic accident types listed in Appendix J, Table 16 are included (including collisions, groundings, and allisions), and tanker trips increase to 645 vessels round trips per year, **there is a risk of an accident roughly twice (1.7 times) per year** (1 accident every 377 tanker round-trip based on historical statistics).

Appendix J, Table 17 includes spill probabilities by vessel type. The origin of the spill probability data by vessel type is not explained, nor are references provided to verify its origin. Table 17 concludes a tanker spill will likely occur within the 20-year lifespan of the terminal. Table 17 predicts substantially longer intervals for an Effective WCD spill using probability statistics with unknown and unsubstantiated origin.

Appendix J, Table 16 shows that two tank vessel groundings have occurred historically (one grounding every 2,632 trips) and tank vessel collisions have occurred historically (one collision every 2,632 trips). The Proposed Action plans to have 365 outbound tanker transits moving oil from the terminal down the Columbia River per year. Based on historic data alone, this would mean there is a risk of a tanker grounding or collision at least once every 7.2 years.[97] Tank vessel allisions are more frequent at one incident for every 588 transits, meaning there is a risk of a tank vessel allision at least every other year.

The EIS should provide information on existing tanker transit routes and hazards compared to the route that tankers will take to reach the proposed Tesoro Savage Petroleum Terminal, and provide an explanation of whether allision, collision, and grounding hazards increase. The risk assessment did not provide data on the type of tankers transiting the Columbia River from 1990-2011, or the route those tankers transited. The route that existing tankers are taking in the Columbia River is important to understand, because some transit routes may have a higher risk of collision, allision or grounding. For example, the DEIS notes there is a higher risk of grounding in the section of the Columbia River from Longview to Tongue Point, especially Pillar Rock, and from Tongue Point to the ocean side of the Columbia River Bar.[98] Therefore, if existing tankers are not transiting these higher risk areas, this would

[96] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Table 3, Page 18.
[97] 365 tanker calls over a period of 7.21 years equates to 2,632 trips.
[98] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Page 19.

be another reason that historic accident statistics would under predict accident risk for tankers that would transit these more hazardous routes in the future.

17. Transfer-Related Spill Statistics Unclear

The DEIS states there was 26 transfer error incidents involving tankers in Puget Sound over a 15-year period 1995-2010, which equates to 1.7 transfer errors per year.[99] The DEIS states that the Effective Worst Case Discharge vessel transfer-related spill statistics estimated for the Tesoro Savage Petroleum Terminal were adjusted downward to account for fewer transfer operations, and use of larger tankers compared to historic statistics.

The DEIS did not consider the age of the facility and experience of personnel involved in the transfer. The Tesoro Savage Petroleum Terminal will be a new facility with new personnel. Transfer errors are reduced by training and experience. A new facility with new personnel is more likely to have a higher initial transfer spill rate than an established facility operated by trained and experienced staff that has worked at that particular facility for a longer period.

Appendix J, Table 18 concludes a worst case transfer spill (while loading a tanker) would only occur once every 1,317 years for a Handymax tanker. There is no explanation in Appendix J of how the Table 18 statistics were computed. The EIS should contain more information to support this estimate. The EIS should also examine the likelihood that transfer-related spills at a new facility will initially be higher than historical spill data until personnel gain experience with the new facility.

18. Tanker Booming

The Applicant proposes to place a “full wrap boom” around each tanker to contain potential spills.[100] The boom would consist of fence boom and river boom. The fence boom would be secured to the berth, and the floating boom would be deployed using a skiff and anchorage at the upriver end to hold the boom into position during vessel loading.[101] However, the Applicant only proposes to boom each tanker if water currents are less than 1.5 knots, wave heights are less than 2-2.5’, wind speeds are less than 35 mph, there is good visibility and no fog, heavy precipitation, snow, freezing or icy conditions, and no debris in the water.[102]

DEIS Appendix D.3, Sub-Appendix K includes a Safe and Effective Threshold Determination Report. A significant conclusion in this report is that continuous and long-term records of wave height, and current data for the Columbia River at the proposed terminal location are not available. The Port of Vancouver facility terminal personnel estimate the current speed to be 1-3 knots along the river (in flood stage) and may exceed 5 knots at the dock face. Wave heights of 2-2.5’ may be exceeded from bow waves and wakes from large vessels passing by or during storms.[103] The Applicant anticipates current speed will be a deterrent to effective pre-booming for a substantial portion of the year.[104]

The DEIS states:

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[99] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Page 19.
[100] DEIS, Chapter 2, Page 2-49 and 2-50.
[101] DEIS, Chapter 2, Page 2-51.
[102] DEIS, Chapter 2, Page 2-52.
[103] DEIS, Appendix D.3, Sub-Appendix K, Page 4.
[104] DEIS, Appendix D.3, Sub-Appendix K, Page 21.

> *Prebooming would occur when the shift supervisor and boom boat captain determine that existing and predicted weather and river conditions are such that booms can be deployed and operated in a safe and/or effective manner. If existing or forecast or river conditions are determined to be unsafe or unsuitable for effective booming operations, booms would not be deployed and already deployed booms would be removed from the vessel.*[105]

The DEIS recommends:

> *Retain a licensed engineer to perform an independent engineering analysis and feasibility study to improve oil recovery in the case of a spill during vessel loading at the dock. The study would determine the number of days it is safe and effective to preboom oil transfers and would identify site-specific improvements to maximize successful prebooming. The Applicant should submit this study to EFSEC. If improvements to allow for prebooming are determined to be unfeasible, the Applicant would be required to implement alternative measures including but not limited to the following measures to mitigate the absence of preventative boom in the water during transfers: stage an appropriate number of dedicated response vessels, deploy additional containment and cleanup equipment, and station trained personnel at the terminal dock and/or at a nearby staging area during oil transfers*[106]

Additionally, the Washington State Department of Ecology's October 2014 Report states:

> *"Pre-booming" tank vessels during transfer operations at refineries and terminal may not be possible with cargoes of highly volatile Bakken crude for safety reasons; this may increase the spread of oil in the event of a spill.*[107]

If it isn't safe or effective to boom a tanker docked at the berth to load oil, then the tanker should not be loaded with crude oil. If a spill were to occur, boom would be required to collect and contain oil. If environmental conditions on the Columbia River are ineffective for booming the tanker during loading, oil spill response booming will be equally ineffective.

The EIS should evaluate alternative terminal locations where tanker pre-booming will be effective during most of the year, otherwise the EIS will need to recommend that tanker loading be limited to periods when tanker booming is effective to prevent oil spills from occurring when tanker booming is not possible due to river conditions that prevent effective pre-booming. This prevention measure will limit that amount of oil that can be loaded per year, and is consistent with a reduced facility alternative.

19. Transfer System (Pipeline to Tanker) Shutoff and Containment

The Applicant proposes to install a transfer pipeline system to route oil to the tankers docked at Berth 13 at a maximum transfer rate of 32,000 bbls/hour with an automatic 30 second shutoff valve.[108] The Applicant proposes to install a three (3) bbl catchment area.

[105] DEIS, Chapter 2, Page 2-52.
[106] EIS, Executive Summary, Page ES-17.
[107] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 55.
[108] DEIS, Chapter 2, Page 2-50.

If a spill occurred during loading at a maximum rate of 32,000 bbls/hour, 267 bbls could be spilled prior to closure of the automatic shutoff valve. The catchment volume should be increased, or the shutoff valve timing should be decreased to reduce the maximum potential spill volume that may reach the catchment.

20. Berth Maintenance and Repair Plan

The Applicant proposes to use Berth 13 to load crude oil tankers, and Berth 14 to store equipment and perform operations associated with oil spill prevention and response.[109] Berths 13 and 14 were constructed in the early 1990s and are now over two decades old.[110] The Applicant proposed to reinforce existing steel piles supporting Berth 13.[111] Future maintenance and repair may be required for Berth 13. With daily tanker loading plans, and no redundant loading berth, it is unclear how Berth 13 will be maintained and repaired over the proposed 20-year facility lifespan.

21. Vessel Spill Frequency Table

Appendix J, Table 20 includes a table that combines the estimated frequency of transfer related spills to the estimated frequency of underway related impact accident spills. The origin of these statistics is entirely unclear. The surrounding text does not explain the origin of the data, nor does the single footnote. It is important that the EIS explain the origin of this data because the conclusions reached estimate very low spill frequencies for both transfer related spills and spills while vessels are underway that need to be clearly supported in the EIS, or adjusted if necessary.

The EIS should provide more information to support the original and validity of the data and conclusions reached in Appendix J, Table 20 related to frequency of transfer related spills and spills while a vessel is underway.

22. Bunkering Related Spills

The DEIS states there is no plan to conduct bunkering operations at the Tesoro Savage Petroleum Terminal and that bunkering would "most likely not" take place in the Lower Columbia River. The DEIS assumes bunkering will take place at the refineries in Puget Sound or California receiving crude oil shipments, or at anchorages in Puget Sound, California, Alaska, or Hawaii.[112]

The EIS should include a prohibition on bunkering operations at the Tesoro Savage Petroleum Terminal and the Lower Columbia River to match the proposed plan and because the EIS did not examine the potential for bunking related spills.

23. Fire and Emergency Response Resources

The DEIS confirms that local fire departments are not currently trained, resourced, or fully equipped to respond to an industrial fire or emergency at the terminal and along the rail corridor.[113]

The Washington State Department of Ecology also came to a similar conclusion in its 2014 report:

[109] DEIS, Chapter 2, Page 2-22.
[110] DEIS, Chapter 2, Page 2-3.
[111] DEIS, Chapter 2, Page 2-24.
[112] DEIS, Appendix J, Vessel Spill Risk Analysis for EFSEC DEIS for Vancouver Energy, Pages 20-21.
[113] DEIS, Executive Summary, Page ES-14 and ES-15.

> *Based on preliminary results of a survey conducted by EMD of the 278 local fire districts through which crude by rail transportation occurs or is likely to occur, 62% believe that their departments are not sufficiently trained or do not have the resources to respond to a train derailment accompanied by fire. Local fire departments and fire protection districts across the rail transportation corridor do not have adequate funding necessary to plan, train and equip their communities for a crude oil incident. These incidents need specialized resources such as fire suppressant foam and support equipment, the ability to monitor for potential human health exposures related to Bakken and other crude oil spills, and the ability to contain spilled oil with specialized oil spill response equipment.*[114]

The Applicant does not propose to provide its own terminal industrial firefighting personnel or equipment.

The EIS should conclude there is insufficient fire and emergency response resources to respond to an industrial fire at the terminal and along the rail corridor. The Applicant should be required to provide its own, professionally trained industrial firefighting personnel and equipment. Railroad operators should also be required to show they have their own, professionally trained industrial firefighting personnel and equipment along the rail corridor, or that they have worked with each volunteer fire department along the route to provide financial resources, training, and capacity building support to ensure the capability is sufficient to respond to a crude oil railcar accident.

24. Geographic Response Plans

The Washington State Department of Ecology's 2014 report concluded:

> *GRPs have not been developed for most of the rail corridors through which crude by rail trains are transiting or will transit in future. There are also significant gaps in GRPs for marine areas. Capacity does not exist in the state to update and field test GRPs on a regular basis.*
>
> *The GRPs also do not address potential responses for potentially submerged or sinking oils. This is a concern for diluted bitumen spills under some conditions, particularly for spills into waters that have high sediment content and are very turbulent. The increased handling of oils that are known (Group V oils) to sink or may weather and sink requires updates in the way oil spill response is conducted in the northwest. Traditionally response and contingency planning has focused on containing and recovering surface floating oil through the use of booms and surface skimmers. Currently there are limitations on the ability to model, track, locate and recover submerged oil. Regulations do not take into consideration submerged oil response planning for oils that may weather and sink that are not classed as Group V oils.*[115]

The Applicant does not propose to develop GRPs along the rail or marine route that oil is transported to or from its facility. Yet, large areas of the inland rail corridor do not have applicable GRPs (e.g., Cheney

[114] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 70.
[115] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Pages 73 and 74.

to Pasco, Washington),[116] GRPs along the proposed vessel route will need to be updated. The DEIS recommends the Applicant be required to "contribute to all updates of the Lower Columbia River GRP and other applicable Northwest GRPs in partnership with Ecology, ODEQ, USCG, and EPA for the lifetime of the Proposed Facility to address the type and amount of crude oil moving to and from the Proposed Facility."[117] However, there here is no requirement for this work to be completed prior to facility approval.

The Applicant should be required to contribute to and complete updates of the Lower Columbia River GRP and other applicable Northwest GRPs in partnership with Ecology, ODEQ, USCG, and EPA, to address the type and amount of crude oil moving to and from the Proposed Facility, prior to construction and operation of the Proposed Facility.

25. Secondary Containment Design

The project proposes to install the mandatory state and federal required secondary containment liner below the storage tanks along with a berm to capture a spill from the crude oil storage tanks. The proposed storage tanks are large tanks, 50' tall and 240' in diameter.[118] All six tanks would be placed into a secondary containment area consisting of a containment berm and an impervious membrane liner under the tank. The containment area is designed to hold 110% of the volume of one tank plus storm water.

The project area is subject to seismic risk. The Applicant proposed ground improvement procedures to prevent tank foundation damage for seismic activity up to an 8.9 magnitude earthquake, but does not propose ground improvement for soils underlying the secondary containment berm.[119] Therefore, there is potential for soil liquefaction and ground deformation below the secondary containment berm.

The DEIS recommends further assessment of potential liquefaction under the berm and improvements to anchor the berm and prevent damage during a large earthquake.[120] The DEIS does not address the risk of tearing or damaging the secondary containment liner during an earthquake, nor make design or soil improvement recommendations for the areas where a secondary containment liner area is placed below the tank.

The secondary containment system (both liner and berm) should be designed to hold crude oil that has escaped a failed storage tank, in a wide range of known and anticipated environmental hazards (including seismic events). The EIS should require improvements to both the liner and berm system to ensure that oil spilled into the secondary containment liner/berm system during a large earthquake will remain in the containment system and that the liner is not a failure point.

26. Tug Escorts and Marine Pilots

Tug escorts are not currently required for crude oil tankers on the Columbia River.[121] Tug escort regulation in Washington only applies to Puget Sound. Tug escorts for crude oil laden tankers have been

[116] DEIS, Chapter 4, Page 4-13.
[117] DEIS, Executive Summary, Page ES-17.
[118] DEIS, Chapter 2, Page 2-18.
[119] DEIS, Executive Summary, Page ES-12.
[120] DEIS, Executive Summary, Page ES-12.
[121] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 59.

proven a critical oil spill prevention measure especially during adverse weather, or to control a tanker during propulsion or steering loss.

The Applicant proposed to use two docking tugs to meet each tanker at the confluence of the Columbia and Willamette rivers and secure alongside the tanker to guide the tanker to the terminal.[122] The Applicant does not propose to have the docking assist tugs stand by the terminal during loading operations, unless severe weather occurs.[123]

The DEIS does not examine the use of tug escorts and the type needed to successfully assist a disabled vessel and prevent it from grounding. More work is needed to determine whether tug escorts should be required for crude oil laden tankers transiting the Columbia River.

The Washington State Department of Ecology identified major challenges for tug escort use on the Columbia River, while the width of the Columbia River varies from up to 5 miles across the mouth, it narrows to about 1.1 miles at the proposed terminal and the deep draft navigation channel is even narrower with one 300' inbound and one 300' outbound lane:[124]

> *The deep draft navigation channel in the Columbia River is 100 miles long and 600 feet wide…A typical escort tug tethered on a long line will not work in many areas. Either the tugs safety would be jeopardized by having to leave the channel to effectively steer a disabled vessel or in much of the river it would not have the response time to be effective.*[125]

The Washington State Department of Ecology also found the current Columbia River vessel tracking system may not be adequate for the proposed increase in tanker traffic on the Columbia River and anticipated reductions in personnel and funding will exacerbate this situation.[126] Improvements in the vessel tracking system should be evaluated.

Handymax tankers are typically 600' long and 105' wide.[127] Larger tankers proposed to service this facility may be up to 900' long and 160' wide. A large tanker would consume most of the 300' deep draft shipping lane and would have priority right-of-way navigating the river over fishing vessels and vessels less than 66' long.[128]

The Applicant also proposes the option of using Articulated Tug Barges (ATBs) to transport crude oil, which carry similar volumes of crude oil to a Handymax tanker.[129] All tankers servicing the proposed terminal would be required to use a vessel pilot service to enter, transit and exit the Columbia River; however, ATBs are not required to use pilots.[130] Marine pilots with Columbia River expertize aid in reducing the risk of accidents on the river. Vessel pilot service should be required for all tankers and ATBs servicing this terminal.

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[122] DEIS, Chapter 2, Page 2-49.
[123] DEIS, Chapter 2, Page 2-49.
[124] DEIS, Chapter 2, Page 2-69.
[125] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 61.
[126] Washington State Department of Ecology, Washington State Marine & Rail Oil Transportation Study Preliminary Findings & Recommendations, Publication Number: 14-08-013, October 1, 2014, Page 62.
[127] DEIS, Chapter 2, Page 2-68.
[128] DE DEIS, Chapter 2, Page 2-68.IS, Chapter 2, Page 2-70.
[129] DEIS, Chapter 2, Page 2-68.
[130] DEIS, Chapter 2, Page 2-70.

27. Acronym Summary

ATB	Articulated Tug Barges
bbl	barrel
BNSF	Burlington Northern Santa Fe
CRC	Clean Rivers Cooperative, Inc.
DEIS	Draft Environmental Impact Statement
DOT	Department of Transportation
DWT	Dead weight tonnage
EFSEC	Energy Facility Site Evaluation Council
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FRP	Facility Response Plan
GRP	Geographic Response Plans
MFSA	Maritime Fire Safety Association
ODEQ	Oregon Department of Environmental Quality
TBD	To be determined
USCG	United States Coast Guard
WCD	Worst Case Discharge